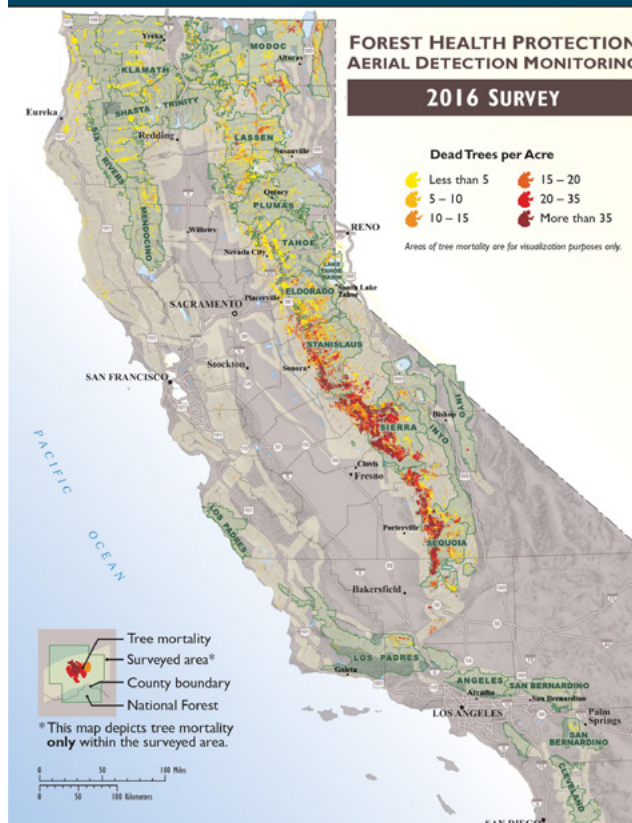


AERIAL SURVEY 2016 CALIFORNIA HIGHLIGHTS

After five years of exceptional drought, mortality progressively intensified and expanded. In 2016, there was a dramatic increase in tree mortality with about **4.3 million acres** containing elevated levels with an estimated **62 million trees** killed. Since the drought began in 2010, an estimated **102 million trees** have died. The heaviest mortality is concentrated in low elevation pine forests in the southern Sierra Nevada, Tehachapi, Transverse and Southern Coast Ranges where the drought situation has been the most extreme and persistent. However, significant mortality was also observed further north and into higher elevations of the Sierra Nevada Range

2016 AERIAL SURVEY DATA OVERVIEW



ACRES SURVEYED	47,200,000
FEDERAL	22,900,000
STATE & LOCAL	900,000
PRIVATE	22,500,000
OREGON/NEVADA	900,000
	(Acres est.)

2016 KEY RESULTS

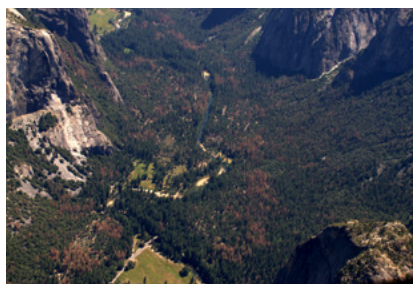
- 1 The west slope of the southern Sierra Nevada range is facing one of the largest tree mortality events in recent history. In many areas between 3000' and 6000' elevation, pine mortality (ponderosa and sugar) is **50 to 100%**.
- 2 In 2016, we recorded another doubling (compared to 2015 levels) of the number of dead trees, primarily attributed to drought and bark beetles. Acres with mortality was also almost double 2015 levels.
- 3 The bulk of the mortality was in generally mixed conifer forest type where ponderosa pine and white fir were the most common component and most heavily affected collectively accounting for an almost **40 million trees** (estimated).
- 4 In more pure-type ponderosa stands mortality attributed to bark beetles was an estimated **10 million additional trees** killed; other pine collectively adding another **4.2 million trees**.
- 5 Other conifer species such as incense-cedar, sugar and Jeffrey pine along with less common pine species were also profoundly affected from the drought and are likely underrepresented since they are typically minor components of mixed conifer stands.
- 6 Scattered locally intense pockets of conifer mortality were common at higher elevations and throughout the region.
- 7 Mortality of pinyon and gray pine was much lower compared to 2015 levels primarily due to previous mortality which decreased competition for scarce water resources for the remaining live trees.
- 8 Mortality of Coulter pine was also greatly reduced but due primarily to lack of viable host in many isolated stands.
- 9 Mortality of Tanoak and to a lesser extent live oak from Sudden Oak Death (SOD) along the coast was also low since drought conditions are not conducive to the spread of this exotic disease.
- 10 Blue oaks showed advanced drought-caused early leaf drop and also high levels of mortality across thousands of acres.



Low elevation pine forest, southern Sierra Nevada.



Intense conifer mortality near Shaver Lake, Sierra NF.



Drought affected conifers, Yosemite Valley.

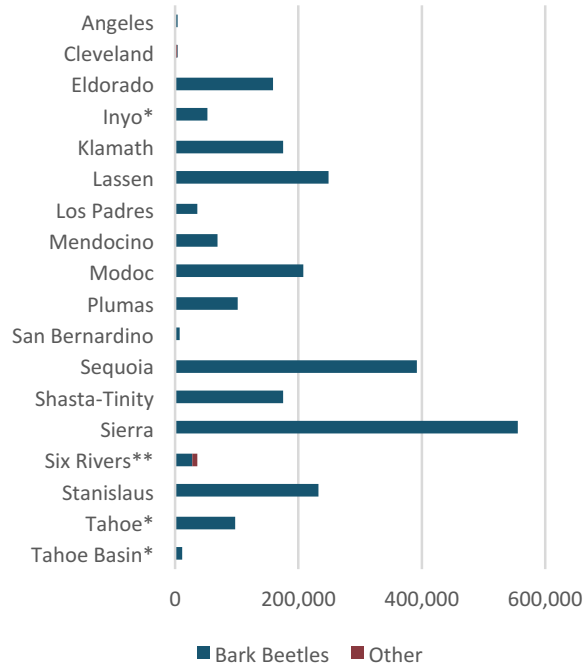


Coulter pine mortality north of Pinnacles National Monument.



Areas of high mortality, northeastern CA, Modoc NF.

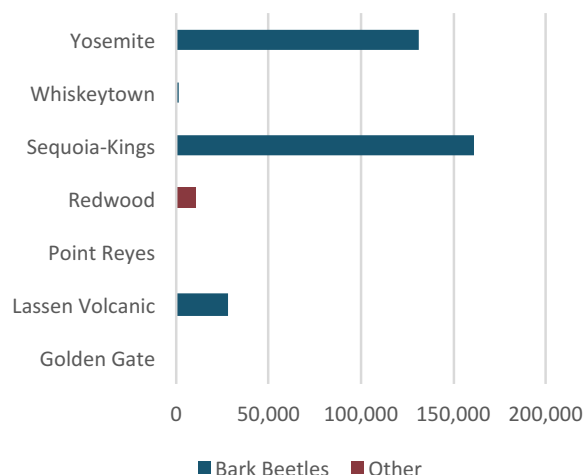
ACRES WITH MORTALITY BY NATIONAL FOREST



* Including mortality mapping in Region 4

** Including mortality mapping in Region 6

ACRES WITH MORTALITY BY NATIONAL PARK



ABOUT

AERIAL SURVEY

The **Aerial Survey Program** is conducted by the Pacific Southwest Region's **Forest Health Protection Program**. Since 1994, aerial surveys have been conducted annually to map recent tree mortality in California across all land ownerships, including all National Forests and forested National Parks, along with state and private lands.

Data is collected by trained specialists using a **Digital Aerial Sketch Mapping (DASM)** system. Flights are typically flown on a 4-mile grid, with two observers mapping out opposite sides at the same time.

The 2016 survey was completed by five observers: Jeff Moore, Amy Jirka, Loren Macafee, Zachary Heath(R6) and Ben Smith between May 15th and September 20th.

Interim and special reports of the 2016 survey findings are available online at: www.fs.usda.gov/detail/r5/forest-grasslandhealth/cid=stelprd3836640.



Scan QR code to visit the program web page for more information as well as data and maps available.

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